

an elastomer portion or there may be a rigid plunger in contact with the sheet spring steel band to push down on the band and dome switch.

[0026] It should also be recognized that the foot **118** formed in the elastomer portion **112** of the keypad **118** may be connected to the sheet spring steel band **130** to make a recessed key in the surface topology of the keypad **106**.

[0027] The following describes several examples of usage of the haptic/tactile input device embodying the present invention for purposes of providing a fuller understanding of the invention.

EXAMPLE 1

[0028] In this example, the mobile telephone is in the phone or communication mode and the user interface surface is flat. When the mobile telephone is switched into the camera mode, the camera trigger button appears on the surface of the user interface. If the camera function is available in the mobile telephone, but something needs to be done before the picture can be taken, the button can be locked temporally into an upward state to indicate that a picture cannot be taken until the item requiring attention is corrected or attended to. For example, the pressing force on the camera trigger button can be altered or increased to provide a warning that the memory for pictures is low requiring more pressing force to on the button to take a picture. The increased pressing force required indicates that attention should be paid to the status of the memory.

EXAMPLE 2

[0029] In this example, the mobile telephone is in the phone or communication mode and the user interface surface topology is flat. When the mobile telephone is switched into media player mode, the media player buttons corresponding to available functions, for example, play/next/prev., appear and protrude on the user interface surface topology. If a user is on the first track, there is no prev. button available. The function availability may also be accented by switching on a backlight for this button contact surface area.

EXAMPLE 3

[0030] In this example, the mobile telephone device is in the phone or communication idle mode and the user interface surface topology is flat. When the mobile telephone receives an incoming call, the answering button appears on the user interface surface. Because the answer function requires the user's immediate attention, the button can be made to indicate the urgency by moving partially to capture user's tactile or visual attention. The user answers the call by pressing the button and the button then disappears from the user interface surface, and another button for ending the call appears on the user interface surface.

[0031] In the examples described above, it will be recognized that the appearance of a button on the user interface surface indicates the availability of the associated function and since the button is only present when the function is available it avoids that the user would press this button accidentally in a situation where he/she is not intending to operate the button. Furthermore, the mechanical obstruction of buttons is avoided and does not present an obstacle when inserting or sliding the mobile telephone device into a pocket.

[0032] It should be recognized by those skilled in the art that there are other mechanisms and methods that may be employed to alter the surface area topology for providing the haptic/tactile input embodying the invention. For example, an array of particles, which can be controlled with electricity, magnetism or temperature to change the particle movement, flexibility or other feature may be sandwiched between the substrate surface a flexible material coating. The arrays form the input devices, for example, buttons, sliders etc., which are visible and haptically detectable. The adaptation may be achieved by multiple technologies.

[0033] In one example, the polarity of a magnetic field between certain parts within the input device may be changed such that the parts to repel to create a topological hill, i.e. active key, or to attract one another to flatten the bump, i.e. to make the key inactive.

[0034] In another example, adaptation may be made directly to the material forming the dome of a regular keypad to alter the topology of the surface of the dome.

[0035] In a further example, bimetal may be used by following a thermometer principle to bulge or protrude the key by making a bimetal part to straighten and curl depending on a temperature change created by and initiated by a device lead to the bimetal causing the surface topology to change accordingly.

[0036] In a further example, a thermoactive liquid is suitably embedded in the substrate material to alter the surface topology by warming the substance to turn it from solid to a liquid and vice versa which changes the volume of the liquid.

[0037] It will be recognized and appreciated that in all the implementations described above, the extent or amount of the bulging and resistivity to pressure from a user's finger may be adaptable to accommodate and achieve a desired operating characteristic.

The invention claimed is:

1. Apparatus, comprising:

an input having a surface area configured for altering its surface topology characteristic in accordance with a given function of an electronic device for providing a haptic operative input corresponding to said given function.

2. The apparatus as defined in claim 1 wherein said input surface area is arranged in a deformable portion of a surface of a suitable substrate.

3. The apparatus as defined in claim 2 wherein said input device is further configured such that said input surface area topology is flush with said surface of said substrate for indicating an unavailable operative input state and protrudes from said surface of said substrate for indicating an available operative input state.

4. The apparatus as defined in claim 2 wherein said deformable portion of said substrate is made of a suitable elastomer material.

5. The apparatus as defined in claim 4 wherein said input is further configured with an actuation mechanism in co-operative engagement with said contact surface area for protruding said contact surface area from said substrate surface for haptic recognition of the presence of said input and for retracting said contact surface area from said substrate surface for haptic recognition of the absence of said input.

6. The apparatus as defined in claim 1 further comprising a plurality of inputs, a first number of which are selectively